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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CHANG, AUDREY Y	
ART UNIT	PAPER NUMBER
2872	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/662,316	PARK, CHAN YOUNG
	Examiner	Art Unit
	Audrey Y. Chang	2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 24 October 2006.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16,19-22,25-28,30,31,34-36 and 40-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16,19-22,25-28,30,31,34-36 and 40-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 24, 2006 has been entered.

2. This Office Action is also in response to applicant's amendment filed on October 2, 2006 which has been entered into the file.

3. By this amendment, the applicant has amended claims 16, 22, 28, 30, and 31, and has canceled 23-24, and 37-39.

4. Claims 16, 19-22, 25-28, 30-31, 34-36, and 40-42 remain pending in this application.

5. The objection to the drawings set forth in the previous Office Action is withdrawn in response to applicant's amendment.

Response to Amendment

6. The amendment filed **October 2, 2006** is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **Claims 16 and 31 have been amended** to include the feature "*voltage is applied by the pair of electrodes, wherein light is transmitted by said corresponding pixel when said voltage is applied by the pair of electrode and when light is not transmitted by said corresponding pixel when said voltage is not applied by the pair of electrodes*". The specification simply fails to disclose such. The applicant is respectfully noted the following disclosure of the specification:

(1). As shown in Figure 8A, when no voltage is applied by the electrode, the diffraction hologram is set up in the liquid crystal holographic element and the incident light is diffracted in the a transmission mode.

(2). As shown in Figure 8B, when voltage is applied by the electrode, the diffraction hologram is *destroyed* in the liquid crystal holographic element and the incident light is transmitted through the element WITHOUT diffraction.

(3). As for arranging the liquid crystal holographic optical element with an optical waveguide, **if the voltage is applied** by the electrodes, the holographic pattern within the liquid crystal (26) is destroyed since the liquid crystal molecules are regularly arranged to have constant refraction index, and since the refractive index is set to be the same as the refractive index of cladding (23) of the optical waveguide, the light within the core (22) **cannot** permeate the liquid crystal holographic element and **no light** will be transmitted out of the display device, (please see paragraph, and will create a **black** picture {0087] to [0089]).

If the voltage is NOT applied by the electrodes, the liquid crystal molecules within the liquid crystal holographic optical element are irregularly arranged so that diffraction hologram pattern is set up, and the refractive index is NOT constant and therefore differs from the refractive index of the cladding layer (23), it is possible for the light within the core to escape to the liquid crystal layer (26) and makes the light *transmitted* and *diffracted out* of the display device to create a **white** picture, (please see paragraphs [0090] to [0092]).

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. **Claims 16, 19-22, 25-28, 30-31, 34-36, and 40-42 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejections based on the newly added matters are set forth in the paragraphs above.

9. **Claims 16, 19-22, 25-28, 30-31, 34-36, and 40-42 are rejected under 35 U.S.C. 112, first paragraph**, as based on a disclosure which is not enabling. The *conditions* of having the refractive index of the liquid crystal holographic optical element to be **constant** and **greater** than the refractive index of the core layer of the waveguide when **the voltage is applied to make the liquid crystal holographic optical element at transparent state and** the light incident on the liquid crystal holographic optical element must be ***greater*** than a *critical angle* in order for the light to be not transmitted through the pixel of the display device **and** the condition of having the liquid crystal holographic optical element to be at **diffraction state** when the voltage is NOT applied and having the refractive index *different* from waveguide in order for the light be transmitted through the pixel of display device are **critical or essential** to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

By simply change the voltage applied across the liquid crystal holographic optical element will not be able to cause the light being transmitted or not transmitted through the pixel, since as shown explicitly in Figures 8A and 8B, the incident light are always "**transmitted**" through the liquid crystal holographic optical element, whether the voltage is applied or not. However the achievement of the

"black picture" and "white picture" is a **combination** of the arrangement of the waveguide and the liquid crystal holographic optical element with either the holographic element is switched to a diffraction state or transmission state, with the diffraction state being the one that the total internal reflection condition of the waveguide is destroyed and light escaped to the holographic optical element and being transmitted and diffracted out or the holographic element is switched to a transmission state such that the refractive index of the holographic optical element is the same as the cladding layer of the waveguide and the total internal reflection of the core layer of the waveguide is maintained so that the light is total internally reflected within the core layer of the waveguide so no light is transmitted through the display device.

The claims at this juncture are wrong and not enabling since it fails to disclose the critical and essential criterions to make the display device an operable device.

Claim Objections

10. **Claims 16, 19-22, 25-28, 30-31, 34-36 and 40-42 are** objected to because of the following informalities:

(1). **Claims 16 and 31 have been amended** to include the recitation of the word "over" in many places that is confusing since it is not clear what does it mean by "over" since there is not definite order or direction defined in the claims.

(2). The newly added phrase "a number times over a predetermined period and frequency, said number of times equal to a gradation level of light to be transmitted by the corresponding pixel" in claims 16 and 31 is confusing since it is not clear what is considered to be the frequency and period? Frequency of what? Period of what? What is this predetermined period and frequency? What is the gradation level of light? Is this referred to intensity level or what?

(3). The phrase "pixel areas" and the phrase "pixel" recited in the claims are confusing since it is not clear if they are the same or not.

(4). It is not clear how does the sub-pixel areas as recited in claims 19 and 34 are defined by the sets of the first and second electrodes and what are these sub-pixel areas as related to the

Appropriate correction is required.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 16, 19, and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Izumi et al, (PN. 5,452,385).

Izumi et al teaches a *display device* (Figure 5) that is comprised of a *light guide medium* that serves as the *light guiding core* for an *optical waveguide* for *receiving* and *guiding* light (as shown in Figure 5), a set of *first electrode* (43a-43d) positioned over the waveguide (40), a liquid crystal medium (42) incorporated with a *holographic diffraction grating* (44), that **together** serves as the *liquid crystal holographic optical element*, positioned on the first set of the electrode and a second set of electrode (45) positioned over the liquid crystal holographic optical element. The first and second sets of the electrodes defined pixel areas for the display device.

Izumi et al teaches that by applying a *non-zero electrical field* across the liquid crystal holographic optical element, the liquid crystal molecules will be oriented to be aligned so that a refractive index of the medium or the liquid crystal holographic optical element is set up to be *greater* than the refractive index of the light guiding core (41) so that the light will transmit through the guiding core and reached to the holographic diffractive grating and being diffracted out of the display device, (please see

electrode 43c in Figures 5 and 7b). Izumi et al also teaches if *no electrical field* is set across the liquid crystal holographic optical element, the liquid crystal molecules are *not oriented* and effective refractive index of the liquid crystal holographic optical element has a value that is *less than* the refractive index of the light guiding core, the light will then be *totally reflected* at the boundary of the light guiding core (41) and the liquid crystal holographic optical element and being transmitted *only through the core* and not reaching the holographic diffractive grating. In this manner, the holographic diffraction grating is selectively adjustable between the state of having light reached it to be diffracted and a state having no light reached it to be diffracted out of the display device, (please Figures 5, 7a-7c, columns 8-9, transmission mode of the display device is explicitly stated in column 9 lines 50-56).

Claim 16 has been amended to include the phrase of "the pair of electrodes applies voltage a number of times over a predetermined period and frequency… to be transmitted by the corresponding pixel". This phrase is objected for lacking clearance. This reference does not teach such explicitly however it is well known in the art that the degrees of the orientation of the liquid crystal molecules are controlled by the amount of voltage applied across, therefore it is obvious to one skilled in the art to adjust the amount of the voltage applied to adjust the degree of intensity of the light being transmitted through.

With regard to claim 25, Izumi et al teaches that the voltage or electrical field can be selectively applied across certain electrodes, therefore pixel area, to cause the light to transmit through the area. Since the degree of orientation of the molecules are based on the magnitude of the applied voltage or electrical field, the percentage of the light transmitted through the areas can be adjusted by the magnitude of the electrical field applied.

With regard to claim 26, Izumi et al teaches to use a light source (47) for generating the input light.

With regard to claim 27, the light guiding core (40) has an area that is the same as the effective display area of the display device, (please see Figure 5).

With regard to claim 28, this reference does not teach explicitly to have a plurality of light guiding cores, however it would have been to one skilled in the art to multiply the waveguide display structures as shown in Figure 5 to make the display has more than one dimension of display area.

13. Claims 30-31, and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Izumi et al in view of the patent issued to Rockwell et al (PN. 5,106,181).

Izumi et al teaches a *display device* (Figure 5) that is comprised of a *light guide medium* that serves as the *light guiding core* for an *optical waveguide* for *receiving* and *guiding* light (as shown in Figure 5), a set of *first electrode* (43a-43d) positioned on the waveguide, a liquid crystal medium (42) incorporated with a *holographic diffraction grating* (44), that together serves as the *liquid crystal holographic optical element*, positioned on the first set of the electrode and a second set of electrode (45) positioned on the liquid crystal holographic optical element. The first and second sets of the electrodes defined pixel areas for the display device.

Izumi et al teaches that by applying a non-zero electrical field across the liquid crystal holographic optical element, the liquid crystal molecules will be oriented to be aligned so that a refractive index of the medium or the liquid crystal holographic optical element is set up to be *greater* than the refractive index of the light guiding core (41) so that the light will transmit through the guiding core and reached to the holographic diffractive grating and being diffracted out of the display device, (please see electrode 43c in Figures 5 and 7b). Izumi et al also teaches if *no electrical field* is set across the liquid crystal holographic optical element, the liquid crystal molecules are *not oriented* and effective refractive index of the liquid crystal holographic optical element has a value that is *less than* the refractive index of the light guiding core, the light will then be *totally reflected* at the boundary of the light guiding core (41)

and the liquid crystal holographic optical element and being transmitted *only through the core* and not reaching the holographic diffractive grating. In this manner, the holographic diffraction grating is selectively adjustable between the state of having light reached it to be diffracted and a state having no light reached it to be diffracted out of the display device, (please Figures 5, 7a-7c, columns 8-9, transmission mode of the display device is explicitly stated in column 9 lines 50-56).

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the light guiding core (40) is on a *cladding layer*. However it is rather well known in the art of waveguide to use a cladding layer for enhancing the total internal reflection function of the light transmitting within the waveguide as shown by **Rockwell** et al in an optical waveguide display system wherein the *core guiding layer* (22, Figure 4) is formed on a cladding layer (20 and 24 Figure 4) for enhancing the total internal reflection of the light at the boundary surface of the core and cladding layer, (please see column 9, lines 23-43). Such modification therefore would have been obvious to one skilled in the art for the benefit of enhancing the light transmission property within the waveguide core layer.

Claim 30 has been amended to include the phrase of "the pair of electrodes applies voltage a number of times over a predetermined period and frequency… to be transmitted by the corresponding pixel". This phrase is objected for lacking clearance. This reference does not teach such explicitly however it is well known in the art that the degrees of the orientation of the liquid crystal molecules are controlled by the amount of voltage applied across, therefore it is obvious to one skilled in the art to adjust the amount of the voltage applied to adjust the degree of intensity of the light being transmitted through.

With regard to claim 40, Izumi et al teaches that the voltage or electrical field can be selectively applied across certain electrodes, therefore pixel area, to cause the light to transmit through the area. Since the degree of orientation of the molecules are based on the magnitude of the applied voltage or

electrical field, the percentage of the light transmitted through the areas can be adjusted by the magnitude of the electrical field applied.

With regard to claim 41, Izumi et al teaches to use a light source (47) for generating the input light.

With regard to claim 42, the light guiding core (40) has an area that is the same as the effective display area of the display device, (please see Figure 5).

14. Claims 16, 19-22, and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Date (PN. 6,6,18,104).

Date et al teaches an *optical display device* having a *light guide* (204, Figures 21A, 2A, 6-11) serve as the *light guiding core* of an *optical waveguide* for receiving and guiding light having a *first set of electrodes* (201) formed over the waveguide and an *optical control layer* having holographic *PDLC* (PDLC stands for polymer dispersed liquid crystal) serves as the *liquid crystal holographic optical element* (200) positioned *over* the first set of electrode and a *second* set of electrode (203) positioned over the second side of the liquid crystal holographic optical element, (please see Figure 21A), such that the first and second sets of the electrode defines pixel areas for the display device.

Date et al teaches by applying different voltage across the liquid crystal holographic optical element the element can be switched to a *diffraction state* (result of a first effective refractive index of the element) and a *transmission state* (result of a second effective refractive index of the element). In particularly, (**with regard to claim 23**), Date et al teaches that when *no voltage* is applied across the electrodes, the liquid crystal holographic optical element is switched to a transmission state such that the incident light with an incidence angle is transmitted through the liquid crystal holographic optical element is totally reflected by a low refractive index layer (202, please see column 30, lines 28-32) back to the light guide or waveguide, and resulting in not light transmitted through the pixel area. Date et al teaches

that when a non-zero electrical field is applied across the electrodes (selected areas of the electrode such as 203') the liquid crystal holographic optical element is activated so that a hologram is formed and the light incident from the waveguide will not satisfy total reflection criterions and the incident light is diffracted by the hologram of the liquid crystal holographic element to produce an image, or light is transmitted through the corresponding pixel area of the display device, (please see Figure 21A and 21B).

Claim 16 has been amended to include the phrase of "the pair of electrodes applies voltage a number of times over a predetermined period and frequency… to be transmitted by the corresponding pixel". This phrase is objected for lacking clearance. This reference does not teach such explicitly however it is well known in the art that the degrees of the orientation of the liquid crystal molecules are *controlled* by the amount of voltage applied across, therefore it is obvious to one skilled in the art to adjust the amount of the voltage applied to adjust the degree of intensity of the light being transmitted through.

With regard to claims 19-22, Date et al teaches that a full color image display device can be achieved by preparing three colors (red, green and yellow) for light sources and switching the light source color in *synchronized* with *display pixels*, which implies the pixel areas comprise sub-pixels of red, green and yellow, (please see column 24, lines 51-56). Although this reference teaches that the colors to be red, green and yellow, however one skilled in the art would understand the full color is achieved by using primary colors namely red, green and blue such modification is considered to be obvious matters of design choices to one skilled in the art to achieve the same function, namely fully color image display. Date et al further teaches that the holographic PDLC or the liquid crystal holographic optical element comprises volume holograms that are *wavelength selective* which means that for making the fully color display, holograms for respectively diffracting light of red, green and yellow or blue colors have to be included to make the full color image display possible, (please see column 18, lines 12-19).

With regard to claim 24-25, Date et al teaches that the liquid crystal holographic optical element is switched between transmission state and diffraction state by varying the value of the voltage applied across the liquid crystal holographic optical element. Since the orientation and the order of the dispersed liquid crystal molecules are a function of the value of the applied voltage or electrical field, by continuously varying the applied voltage, different transmittance of the light can be achieved. And the light for reaching the selected areas of the electrodes can be adjusted between the 0% (where diffractive state is the fullest) to 100% when the no diffraction occurs.

With regard to claims 26, it is implicitly true that there is a light source for generating the input light.

With regard to claim 27, the substrate waveguide, (Figures 21A and 21B, and 12 and 13), serves as the light guiding core and has an area that can be identified as effective display area.

With regard to claim 28, these references do not teach explicitly that the optical waveguide comprises a plurality of light guiding cores. However it would have been obvious to one skilled in the art to combine a plurality of the waveguide with the output holographic optical elements disposed upon it (such as Figures 11-13) for the benefit of making a larger display device.

15. Claims 30-31, 34-36, and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Date et al and in view of the patent issued to Rockwell et al (PN. 5,106,181).

Date et al teaches an *optical display device* having a *light guide* (204, Figures 21A, 2A, 6-11) serve as the *light guiding core* of an *optical waveguide* for receiving and guiding light having a *first set of electrodes* (201) formed over the waveguide and an *optical control layer* having holographic *PDLC* (PDLC stands for polymer dispersed liquid crystal) serves as the *liquid crystal holographic optical element* (200) positioned over the first set of electrode and a *second* set of electrode (203) positioned at

the second side of the liquid crystal holographic optical element, (please see Figure 21A), such that the first and second sets of the electrode defines pixel areas for the display device.

Date et al teaches by applying different voltage across the liquid crystal holographic optical element the element can be switched to a *diffraction state* (result of a first effective refractive index of the element) and a *transmission state* (result of a second effective refractive index of the element). In particularly (with regard to claim 30), Date et al teaches that when *no voltage* is applied across the electrodes, the liquid crystal holographic optical element is switched to a transmission state such that the incident light with an incidence angle is transmitted through the liquid crystal holographic optical element is totally reflected by a low refractive index layer (202, please see column 30, lines 28-32) back to the light guide or waveguide. Date et al teaches that when a non-zero electrical field is applied across the electrodes (selected areas of the electrode such as 203') the liquid crystal holographic optical element is activated so that a hologram is formed and the light incident from the waveguide will not satisfy total reflection criterions and the incident light is diffracted by the hologram of the liquid crystal holographic element to produce an image, (please see Figure 21A and 21B).

This reference has met all the limitations of the claims. Date et al does not teach explicitly that the light guiding core (204) is on a *cladding layer*. However it is rather well known in the art of waveguide to use a cladding layer for enhancing the total internal reflection function of the light transmitting within the waveguide as shown by **Rockwell** et al in an optical waveguide display system wherein the *core guiding layer* (22, Figure 4) is formed on a cladding layer (20 and 24 Figure 4) for enhancing the total internal reflection of the light at the boundary surface of the core and cladding layer, (please see column 9, lines 23-43). Such modification therefore would have been obvious to one skilled in the art for the benefit of enhancing the light transmission property within the waveguide core layer.

Claim 30 has been amended to include the phrase of "the pair of electrodes applies voltage a number of times over a predetermined period and frequency… to be transmitted by the corresponding

pixel". This phrase is objected for lacking clearance. This reference does not teach such explicitly however it is well known in the art that the degrees of the orientation of the liquid crystal molecules are *controlled* by the amount of voltage applied across, therefore it is obvious to one skilled in the art to adjust the amount of the voltage applied to adjust the degree of intensity of the light being transmitted through.

With regard to claim 31, Date et al teaches that at the first state when there is no diffraction occurs the liquid crystal holographic optical element seems to have the same refractive index as the waveguide or light guise assembly such that the include light passes through the interface of the two without any refraction, (please see Figures 21A and 21B). This requires the cladding layer has the refractive index that matches the refractive index of the liquid crystal holographic optical element.

With regard to claims 34-36, Date et al teaches that a full color image display device can be achieved by preparing three colors (red, green and yellow) for light sources and switching the light source color in *synchronized* with *display pixels*, which implies the pixel areas comprise sub-pixels of red, green and yellow, (please see column 24, lines 51-56). Although this reference teaches that the colors to be red, green and yellow, however one skilled in the art would understand the full color is achieved by using primary colors namely red, green and blue such modification is considered to be obvious matters of design choices to one skilled in the art to achieve the same function, namely fully color image display. Date et al further teaches that the holographic PDLC or the liquid crystal holographic optical element comprises volume holograms that are *wavelength selective* which means that for making the fully color display, holograms for respectively diffracting light of red, green and yellow or blue colors have to be included to make the full color image display possible, (please see column 18, lines 12-19).

With regard to claim 40, Date et al teaches that the liquid crystal holographic optical element is switched between transmission state and diffraction state by varying the value of the voltage applied across the liquid crystal holographic optical element. Since the orientation and the order of the dispersed

liquid crystal molecules are a function of the value of the applied voltage or electrical field, by continuously varying the applied voltage, different transmittance of the light can be achieved. And the light for reaching the selected areas of the electrodes can be adjusted between the 0% (where diffractive state is the fullest) to 100% when the no diffraction occurs.

With regard to claims 41, it is implicitly true that there is a light source for generating the input light.

With regard to claim 42, the substrate waveguide, (Figures 21A, 21B and 11-13), serves as the light guiding core and has an area that can be identified as effective display area.

Response to Arguments

14. Applicant's arguments filed on October 2, 2006 have been fully considered but they are not persuasive. The newly amended claims have been fully addressed and they are rejected for the reasons stated above.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.